

Chapter 4: Economic Opportunities



The CSNE economic team conducted an assessment of the cost of implementation and economic benefits associated with approximately 80 of the more than 100 potential actions developed by the working groups. The objective of the economic assessment was to estimate the approximate “level of magnitude” of the economic impacts, and to provide an indication of the expected timing and distribution of the impacts and benefits for each action. The detailed modeling assumptions and conclusions of CSNE’s analysis for each potential action are provided in Appendices 6 and 7.

CLIMATE CHANGE POLICY ECONOMIC IMPACTS

Economic considerations of climate change policies are important. Policies that address climate change have costs. However, for many climate change policies there are significant net economic benefits¹. The keys to realizing these economic benefits are to first identify policies that reduce greenhouse gases at a relatively low cost, and then to ensure that a signifi-

cant portion of the costs are investments that reduce energy use and expenditures over time, and also reduce spending on imported energy sources.

The primary benefits of the potential climate change policy actions analyzed can be categorized as:

- Reduced spending by consumers, businesses and government on imported fossil fuels.
- Redirection of spending (from the above) directly into the state’s economy, which increases state output and creates jobs.
- Reduced exposure to volatile imported energy prices, enabling a more stable business cost and investment environment in the state.
- Business development opportunities and job creation related to energy efficiency and generation of renewable sources of energy.
- Avoidance of costs associated with degradation of the natural environment and ecosystems and related decline

in natural resources, tourism and related industries.

- Avoidance of costs associated with health care and related costs related to toxic emissions and climate change.

While New Hampshire cannot avoid climate change impacts by in-state actions alone, New Hampshire's actions can help spur other states and the federal government to take steps to mitigate climate impacts which can positively further impact all of the above.

New Hampshire's economic well-being has long been heavily dependent on tourism businesses related to summer, autumn, and winter outdoor recreation in the natural beauty of our mountains, lakes, rivers and seacoast. It has also been recognized for many years that economic vitality and environmental protection are inextricably linked, and there is no reason to believe that addressing climate change should be different. This becomes even clearer when considering the high and volatile cost of imported energy sources and the burden that high usage of energy places on the New Hampshire economy.

The state is favorably positioned to benefit economically from policies to address climate change. Nationally, the most negative economic impacts from potential climate change policies are expected to be with fossil fuel producers and energy intensive industries. New Hampshire does not have fossil fuel natural resources and, because of the state's historically high energy costs, energy intensive industries have tended not to concentrate in the state. The state is well positioned to benefit from climate change policies that reduce energy use and lead to lower expenditures on energy by New Hampshire businesses and residents. Reduced energy costs will enable more New Hampshire dollars to stay in the nation, region and state rather than being "exported out" to fossil-fuel producing areas. Reducing energy use, principally fossil fuels and other sources imported into the state, will result in more money spent in and recycled (with multiplier benefits) in the New Hampshire economy; a process leading to job creation and other economic benefits.

In the current context of declining economic prospects nationally and in New Hampshire, climate change policies can provide an economic bright spot. There are many different types of jobs in the so-called green economy. Green jobs can be segmented into five different categories: *Energy Efficiency* (EE), *Environmental Services* (ES), *Green Transportation* (GT), *Renewable Energy* (RE), and *Smart Tech* (ST)². Each of these aggregates includes a cluster of industries, which contribute to

environmental improvement and sustainability. Most relevant to climate change policies and discussion below is the *Energy Efficiency* category. This category consists of industries applying measures or practices to help use energy more effectively or efficiently. *Environmental Services* consists of industries that provide services directly or indirectly linked to the sustainability and improvement of the environment (not directly linked to energy use). *Green Transportation* consists of industries that provide or produce relatively "environmentally friendly" transportation. *Renewable Energy* consists of industries that produce energy from sources that can be renewed. *Smart Tech* consists of industries that research, produce, or provide services that directly or indirectly relate to the improvement of technology in the four other green industry categories.

Using this classification in 2007, there were 3.6 million green jobs in the U.S. (3.2 percent of employment). Green jobs tend to be well paid. Nationally, green jobs averaged \$57,000 in annual wages. This is about 25 percent above the average for all industries. New Hampshire with 17,000 green jobs has approximately the U.S. average concentration of green jobs also at 3.2 percent of total employment as green jobs³. The average annual earnings in green industries in New Hampshire is \$54,400. This is 23 percent above the (all industries) average annual wage in the state. New Hampshire has well above average concentrations of green jobs in Smart Tech. New Hampshire has below the average concentration of green jobs in energy efficiency, green transportation, environmental services and renewable energy. If New Hampshire had a similar percentage of green jobs as Maryland, there would be an increase of about 6,000 green jobs adding about 1 percent to the state's employment base. There are opportunities for public policies, such as those associated with climate change action, to build on the strong base of smart tech employment and encourage growth in energy efficiency, renewable energy, green transportation and environmental services.

The main types of business development and employment opportunities associated with policies to address climate change in New Hampshire will be in such areas as: energy auditing; energy efficient building construction/construction trades; and research and development in the design of buildings, infrastructure and systems to be more energy efficient and with minimal environmental impact. The state has a particular strength in the development side of R&D and also in architectural and environmental engineering. For example, Autodesk in Manchester provides software to help design

buildings to minimize energy use and environmental impact. Another business and employment development area is in the field of alternative energy system/source design and production including developing more efficient uses of wind, wood, water, and other natural resources in the state.

New Hampshire climate change policies can also position the state to take advantage of President Barack Obama’s expected Green Jobs Proposal. President Obama’s forthcoming plan for the green economy included federal investment of \$150 billion over 10 years even before the September-December 2008 sharp decline in the U.S. economy. This had been anticipated to generate 5 million jobs nationally by the campaign. Now the administration plans to accelerate this as part of its economic recovery proposal to as much as \$100 billion in the next two years. This amount is significant. For New Hampshire, it could represent 16,000 jobs in the near term and 25,000 jobs over ten years on top of the current green job base. The total green jobs in New Hampshire in 2018 could be well over 40,000, or about 8 percent of total state employment, about the current percentage in financial services. Implementation of climate change policies could position New Hampshire well for leveraging and tapping into the new administration’s green jobs initiatives.

**ECONOMIC ASSESSMENT
METHODOLOGY**

To understand the costs of implementation and cost benefit, and therefore the economic development potential of many of the potential actions under review, CSNE performed detailed and transparent economic analyses to complete the analysis of the potential CO₂ emission reductions. The CSNE economic assessment was limited by available data and the short time frame for the analysis and Task Force work. As a result all potential actions could not be evaluated adequately for economic costs and benefits. CSNE engaged in some original research and also drew on the investigators’ previous analysis of the potential economic impacts of the Renewable Portfolio Standard⁴ and the Regional Greenhouse Gas Initiative (RGGI)⁵ in New Hampshire. Investigators also drew on existing research and inquiry undertaken for other states and internationally when appropriate.

Annual costs and benefits in 2025 for individual actions were reported using the following scale:

Low	\$0 to \$2.5 million
Moderately Low	\$2.5 million to \$25 million
Moderate	\$25 million to \$125 million
Moderately High	\$125 million to \$500 million
High	\$500 million to \$1 billion
Very High	Greater than \$1 billion

For some actions, costs and benefits were determined to be uncertain without significant additional research or not estimated (e.g., costs and benefits were generally not estimated for policy actions or studies not expected to result in direct CO₂ reductions). Actions were evaluated taking into account who is expected to experience the costs and/or benefits (e.g., consumers, government, business) and whether the impacts would be evenly distributed across each sector or concentrated on a particular subset (e.g., on lower-income consumers).

The analysis was limited to direct costs and benefits to the New Hampshire economy, and did not include consideration of regional or national economic costs or benefits associated with actions taken within New Hampshire. As much as possible, direct employment impacts and cost savings, such as those from reduced fuel consumption, were estimated.

The costs and benefits of adaptation actions, as described in detail in Chapter 3, were not specifically quantified as part of the economic analysis; however, net benefits are expected from avoided impacts of climate change within our state. Many additional benefits associated with various potential actions, such as avoided health costs resulting from improved local air quality and economic benefits of reduced traffic congestion, also were not able to be estimated as part of the economic analysis, but are identified in the detailed consideration of each potential action report provided in Appendices 4 and 5.

OVERVIEW OF RESULTS

New Hampshire’s Climate Action Plan is expected to have a net positive impact on New Hampshire’s economy as many of the recommendations evaluated are projected to have a net positive economic benefit by policy year 2025 (Figure 4.1). While the assessment of economic benefits of various policy actions was conducted for all years, the year 2025 benchmark was selected to reflect, as highlighted above, that up-front costs in many cases are investments that can have a positive return but that it would take some time for that positive return to be realized.

CSNE identified that much of the economic benefit of actions to address climate change stem from the reduction in expenditures on energy and the reinvestment of these savings in New Hampshire’s economy. Although not always specifically quantified, additional economic benefits are expected as a result of new job creation and local economic expansion resulting from investments in New Hampshire’s green economy and opportunities created by actions to reduce CO₂ emissions.

Of all the actions considered, the greatest economic and environmental benefits come from reducing residential energy use 70 percent. The next most favorable action is increasing CAFE standards to 50 mpg, followed by fuel efficiency rebates.

The following briefly summarizes the economic assessment of the actions associated with each of the ten overarching strategies described in Chapter 2. Detailed projections of the economic costs of implementation and the cost benefits associated with each action can be found in Appendix 6. Descriptions of the economic assessment for each potential action can be found in Appendix 7.

1. Maximize energy efficiency in buildings:

Implementation costs are projected to generally be high to very high, due to high estimated construction costs to re-

rofit existing buildings and build more energy efficient new buildings, and are also projected to be incurred immediately. Improved energy efficiency of buildings is expected to greatly reduce greenhouse gas emissions and to provide high to very high economic benefits, generally exceeding initial implementation costs, and these benefits would occur every year once the improvements in building efficiency were made . Exemplary of this category, as shown in Figure 4-1, is *Making Existing Residential Buildings 70 percent More Efficient*, which exhibits both very high projected reductions in CO₂ emissions and very high projected overall net economic benefit.

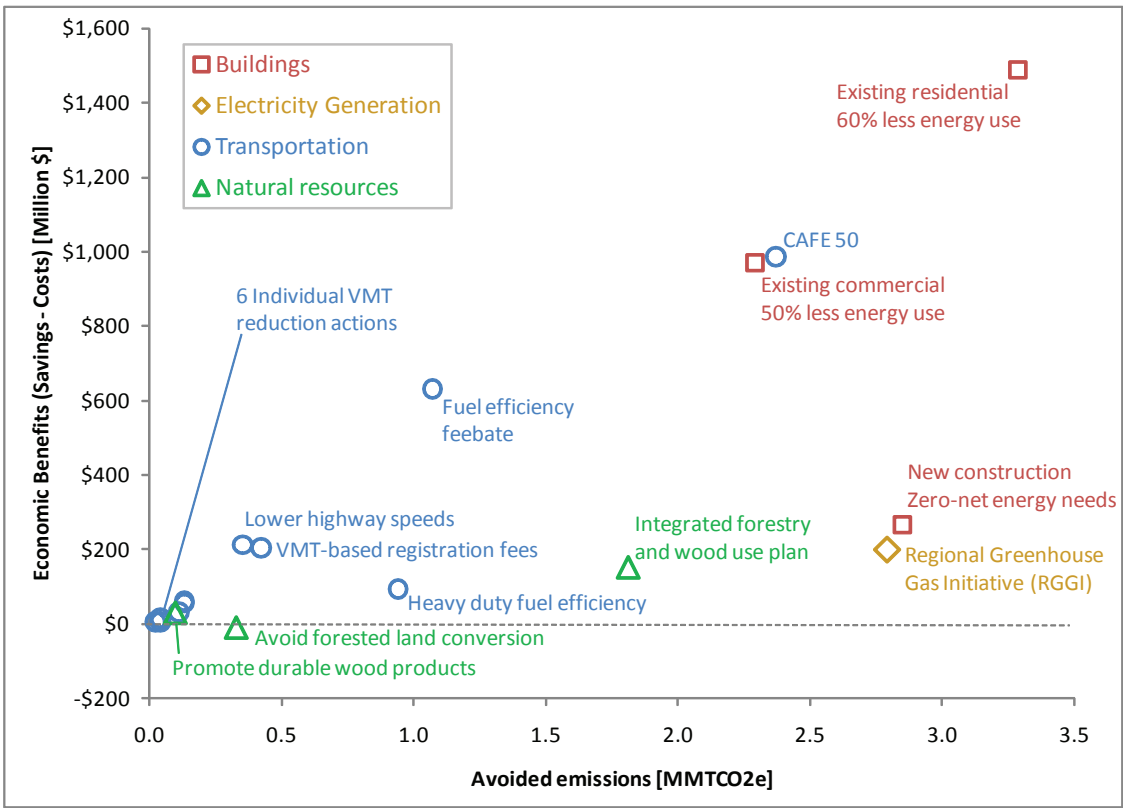
2. Increase renewable and low-CO₂-emitting resources in a long-term sustainable manner:

Implementation costs are projected to be moderate to low. These actions are projected to provide moderate to high economic benefits and result in high reductions in greenhouse gas emissions. Costs and benefits are projected to be evenly distributed over time and across all sectors.

3. Support regional and national actions to reduce greenhouse gas emissions:

Implementation costs are projected to be generally moderately high and spread out over time, primarily due to the high cost of technological improvements to increase average

Figure 4.1 – Annual Economic Benefits and Avoided Emission Reductions of Selected Actions in 2025



vehicle gas mileage, which are projected to be passed on to consumers through higher vehicle prices. The direct cost to New Hampshire to support national and regional policy changes are projected to be low, but incurred immediately. These actions are projected to result in substantial CO₂ reductions, with potential economic benefits ranging from moderate

to very high and occurring over time. Figure 4.1 illustrates these results for increasing vehicle CAFÉ standards (i.e., raising average vehicle fuel efficiency) and incentives to encourage purchases of higher fuel efficiency vehicles by consumers (e.g., rebates); both of these actions are projected to provide high emission reductions and high net economic benefit.

4. Reduce vehicle emissions through state actions:

Implementation costs for the recommended actions supporting this overarching strategy are projected to be low to moderately low, while potential economic benefits are also projected to be low to moderately low. Most implementation costs are projected to occur over time. Some benefits occur evenly over time and some take longer. Costs and benefits are projected to be evenly distributed across the sectors affected.

5. Encourage appropriate land use patterns that reduce vehicle-miles traveled:

Implementation costs for these actions are projected to be low, to occur over time, and to be largely borne by state government, although direct action by local municipalities and developers would also be required. Potential economic benefits were not estimated due to high uncertainty.

6. Reduce vehicle-miles traveled through an integrated multi-modal transportation system:

The recommended actions to improve New Hampshire's transportation system are projected to have low to moderate implementation costs, with moderate to moderately low benefits, generally resulting in positive net economic benefits. Although requiring substantial public funding, most costs and benefits would affect consumers and are projected to be evenly distributed.

7. Protect natural resources (land, water, and wildlife) to maintain the amount of carbon fixed or sequestered:

Implementation costs are projected to range from low to moderately high, to occur evenly over time, and to be borne by government or business depending on the specific action. Benefits are generally projected to be moderate, to range from being evenly distributed over time to longer term, and to be

more evenly distributed across sectors, with some actions providing higher benefits to business. Note that the wide range of ecosystem services provided by forested landscapes were not included in this analysis.

8. Lead by example in government operations:

Costs and benefits of recommended actions under this overarching strategy are generally projected to be low. They are expected to result in positive net financial benefits for state government over time. Most implementation costs are projected to occur immediately, while most benefits occur over time as energy efficiency measures are put in place.

9. Plan for how to address existing and potential climate change impacts:

Immediate implementation costs of the recommended actions are projected to be low, while future implementation costs are uncertain at this time. Potential economic benefits were not specifically estimated.

10. Develop an integrated education, outreach and workforce training program:

Implementation costs are projected to be low to moderately low, to be concentrated early on in implementation and to fall on state government. Benefits are projected to be moderate to moderately high, to be realized soon after implementation and to continue over the long term, and to benefit consumers and businesses.

SUMMARY

There are costs associated with policies to address climate change. A significant portion of the costs are concentrated at the initial stages of implementation. Over time, however, many of the policies considered result in net economic benefits. The details of CSNE's cost of implementation and cost benefit analysis are summarized in the tables in Appendix 6. The key to capturing net economic benefits is to give priority to policies that reduce CO₂ emissions at relatively low costs and view the costs as investments that over time reduce energy use and expenditures on energy sources imported into the state. The best example of this is reducing residential energy use.